

REMARKS

Claims 1-18 and 25-39 are all the claims pending in the application. By this Amendment, Applicant editorially amends claims 1-18 and 25-34. The amendments to claims 1-18 and 25-34 were made for reasons of precision of language and consistency, and do not narrow the literal scope of the claims and thus do not implicate an estoppel in the application of the doctrine of equivalents. The amendments to claims 1-18 and 25-34 were not made for reasons of patentability.

The Examiner objected to the Abstract and rejected claims 1-18 and 25-39 under 35 U.S.C. § 112, second paragraph and claims 1, 3-5, 8-11, 27 and 28 under 35 U.S.C. § 102(b). In addition, the Examiner has indicated that claims 6, 7, 16-18, 25, 26 and 34-39 contain allowable subject matter.

I. Foreign Priority.

Applicant thanks the Examiner for acknowledging the claim to foreign priority under 35 U.S.C. § 119. Applicant respectfully submits that a certified copy of the priority document (Priority Document No.: 2000-190231) is submitted herewith.

II. Objection to the Abstract.

The Examiner objected to the Abstract of Disclosure for including legal phraseology (page 2 of the Office Action). Applicant amends the Abstract to exclude the objected phraseology. In view of these amendments to the Abstract, Applicant respectfully requests the Examiner to withdraw this objection.

III. Claim Rejection under 35 U.S.C. § 112, second paragraph.

The Examiner rejected claim 1-18 and 25-39 under section 112, second paragraph.

Applicant thanks the Examiner for indicating with particularity the aspects of the claims thought to be indefinite. With respect to claim 1, among other minor informalities, which have been fixed, the Examiner asserts that there is insufficient antecedent basis for “the detected vibration level” and that the preamble of the claim is directed to a different method than the body of the claim. Applicant respectfully disagrees with the Examiner and respectfully requests that the Examiner reconsider and withdraw this rejection in view of the following remarks.

In claim 1, previous recitation of “detecting a vibration level”, appearing on line 3 of claim 1, renders the antecedent basis for “the detected vibration level” appearing on lines 5-6 of claim 1. See MPEP § 2173.05(e), “If the scope of the claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite (e.g. “controlled stream of fluid” provides sufficient antecedent basis for “the controlled fluid”, *Ex parte Porter*, 25 USPQ2d 1144, 1145 (BPAI 1992)). Since only one vibration level is being recited in claim 1, the scope of the claim is clearly ascertainable.

In addition, the preambles of the claims are now directed to a vehicle running state estimation method; and the bodies are directed to the same. For example, as now amended, claim 1 recites: “*estimating the running state of the vehicle*” by determining a condition of a road surface on which the vehicle is running or a running state of each tire. As such, the body is also directed to “estimating the running state of the vehicle”. Therefore, Applicant respectfully requests the Examiner to withdraw this rejection of the claims.

With respect to claims 2-6, 8-10 and 27, Applicant amends the claims to fix the minor informalities asserted by the Examiner on pages 4-5 of the Office Action. In view of these amendments, it is respectfully submitted that claims 2-6, 8-10 and 27 no longer include the potential informalities mentioned by the Examiner. Therefore, the Examiner is respectfully requested to withdraw the objections to the claims 2-6, 8-10 and 27.

IV. Claim Rejections under 35 U.S.C. §102 (b).

The Examiner rejected claims 1, 3-5, 8-11, 27 and 28 under 35 U.S.C. § 102(b) as being anticipated by USP 5,065,618 to Hodges, Sr. et al. (hereinafter Hodges). Applicant respectfully traverses this rejection and respectfully requests the Examiner to reconsider the rejection in view of the following comments.

Claims 1 and 3-5

Of these claims, only claim 1 is independent. Claim 1, as now amended, recites a novel combination including:

estimating the running state of the vehicle
by determining at least one of a condition
of a road surface on which the vehicle is
running and a running state of each tire.

The Examiner asserts that claim 1 is directed to a method of estimating the running state of the vehicle and is anticipated by Hodges. The Examiner asserts that Hodges' processing of acceleration and force signals is equivalent to estimating the running state of the vehicle as set forth in claim 1 (see page 5 of the Office Action). This ground of rejection is respectfully submitted to be incorrect as a technical matter. Hodges' discussion of processing the

acceleration and force signals is clearly different from estimating the running state of the vehicle as set forth in claim 1.

Hodges teaches a method and an apparatus for measuring the physical profile of a road surface, its roughness e.g., the presence of bumps (col. 1, lines 40 to 51). Specifically, Hodges teaches using a combination of the measured acceleration and force at the wheel hub, along with other characteristics of tires, to determine the vertical elevation of the road surface (col. 6, lines 40 to 60). Hodges teaches using a force transducer and an accelerometer to measure vertical force and acceleration at each of the four wheels (col. 4, lines 18 to 46).

That is, a transducer for measuring force is mounted at the interface of the axle and the hub of each measuring wheel. Hodges discloses a first signal as a function of the force imposed by the vertical axle on the hub as the vehicle is propelled over the terrain (col. 14, lines 5 to 10). The acceleration measuring means measures the acceleration of the hub in a direction normal to the terrain surface. The obtained data is manipulated in frequency domain for precision (col. 3, lines 40 to 52).

However, Hodges fails to teach or suggest estimating the running state of the vehicle based on the road conditions. Hodges only teaches detecting “vertical displacement x of the wheel/terrain interface to provide a road/terrain profile”. That is, Hodges is directed to method and apparatus for determining a terrain surface profile (whether bumps are present on the road) and not on the running condition of the vehicle. In short, Hodges does not teach or suggest estimating the running state of the vehicle based on road conditions.

Therefore, the novel combination of claim 1 including *estimating the running state of the vehicle* is not suggested or taught by Hodges, which lacks estimating the running state of the vehicle based on road conditions. For at least these reasons, it is respectfully submitted that independent claim 1 is patentably distinguishable from Hodges. Therefore, Applicant respectfully requests the Examiner to reconsider and to withdraw this rejection of independent claim 1. Claims 3-5 are allowable at least by virtue of their dependency on claim 1.

Claim 8

Next, Applicant traverses the rejection with respect to the independent claim 8. Claim 8, as now amended, recites a novel combination including:

means for calculating a vibration level at a
predetermined frequency band by analyzing
the frequency of the detected vibration
level;...

The Examiner asserts that claim 8 is directed to an apparatus for estimating the running state of the vehicle and is anticipated by Hodges. The Examiner asserts that Hodges' vertical displacement x of the tire/terrain interface as defined by the equation is equivalent to means for calculating a vibration level at a predetermined frequency band as set forth in claim 8 (see page 6 of the Office Action). This ground of rejection is respectfully submitted to be incorrect as a technical matter. Hodges' discussion of vertical displacement of x as defined by the equation is not similar to calculating a vibration level at a predetermined frequency band as set forth in claim 8.

Hodges teaches eliminating errors by performing manipulations in frequency domain using Fourier Transformations. This methodology provides for the determination of the spectrum of the roadway perturbations in the frequency domain. This allows for the quantification of amplified perturbation inputs while maintaining the same relative amplitude of input at all frequencies (col. 3, lines 40 to 52). Hodges further teaches having a statistical representation of the road elevation as a function of frequency (col. 7, lines 30 to 57).

However, Hodges just teaches obtaining vertical displacement by using frequency domain. That is, frequency is used to obtain $X(f, T)$, Fourier Transform of the elevation versus distance profile of the terrain. Hodges fails to teach or suggest calculating a vibration level at a predetermined frequency band. In fact, Hodges uses all frequencies to find $X(f, T)$ and there is no predetermined frequency band for determining a vibration level.

In addition, claim 8 contains features similar to the features argued above with respect to claim 1, namely, estimating the running state of the vehicle. Those arguments are respectfully submitted to apply with equal force here.

Therefore, the novel combination of claim 8 including *calculating a vibration level at a predetermined frequency band* is not suggested or taught by Hodges, which lacks calculating vertical displacement at a predetermined frequency band. For at least these reasons, Applicant respectfully submits that independent claim 8 is patentably distinguishable from Hodges. Therefore, Applicant respectfully requests the Examiner to reconsider and to withdraw this rejection of independent claim 8.

Claim 9

Next, Applicant respectfully traverses the rejection with respect to the independent claim

9. Claim 9, as now amended, recites a novel combination including:

road surface condition estimation means for
estimating condition of a road surface from
a value obtained by carrying out an
operation on at least two vibration levels
at different frequency bands by analyzing
the frequency of the detected vibration
level....

The Examiner asserts that claim 9 is directed to an apparatus for vehicle estimating the running state of the vehicle and is anticipated by Hodges.

The Examiner asserts that Hodges' teaches analyzing each wheel separately, thereby each wheel has its own unique vibration level/frequency band measurement (see page 6 to 7 of the Office Action). As such, the Examiner alleges that it is equivalent to estimating condition of a road surface based on a value obtained by carrying out an operation on at least two vibration levels at different frequency bands by analyzing the frequency of the detected vibration level. This ground of rejection is respectfully submitted to be incorrect as a technical matter. Hodges' discussion of obtaining vertical displacement of x is clearly different from estimating condition of a road surface based on value obtained by carrying out an operation on at least two vibration levels at different frequency bands as set forth in claim 9.

However, as acknowledged by the Examiner, Hodges teaches measuring each wheel independently. Therefore, these alleged "vibration levels" are acquired from different sources, one for each wheel. That is, Hodges fails to teach or suggest obtaining at least two vibration

levels at different frequency bands by analyzing the frequency of the detected vibration level. In short, in Hodges, each detected alleged vibration level will be analyzed separately but one detected vibration level will not be used to obtain at least two vibration levels at different frequency bands.

Therefore, the novel combination of claim 9 including *a value obtained by carrying out an operation on at least two vibration levels at different frequency bands by analyzing the frequency of the detected vibration level* is not suggested or taught by Hodges, which lacks calculating vertical displacement by analyzing detected vibration coming from one source at two different frequency bands. For at least these reasons, Applicant respectfully submits that independent claim 9 is patentably distinguishable from Hodges. Therefore, Applicant respectfully requests the Examiner to reconsider and to withdraw this rejection of independent claim 9.

Claim 10

Next, Applicant traverses the rejection with respect to the independent claim 10. Claim 10, as now amended, recites a novel combination including:

means of calculating a vibration
transmission level at a predetermined
frequency band between said at least two
vibration detection points....

The Examiner asserts that claim 10 is directed to an apparatus for vehicle estimating the running state of the vehicle and is anticipated by Hodges for the same reasons as claim 9. Specifically, the Examiner asserts that Hodges' teaches analyzing each wheel separately, thereby each wheel

has its own unique vibration level/frequency band measurement (see page 6 to 7 of the Office Action). As such, the Examiner alleges that Hodge's method is equivalent to calculating a vibration transmission level at a predetermined frequency band between said at least two vibration detection points. This ground of rejection is respectfully submitted to be incorrect as a technical matter. Hodges' discussion of obtaining vertical displacement of x is different from calculating a vibration transmission level at a predetermined frequency band between said at least two vibration detection points as set forth in claim 10.

For example, as acknowledged by the Examiner, Hodges teaches measuring each wheel independently, thereby obtaining individual values. But the reference fails to teach or suggest calculating a vibration transmission level between at least two points. Moreover, Hodges fails to teach or suggest calculating a vibration transmission level.

In addition, claim 10 recites a feature similar to a feature argued above with respect to claim 8, namely calculating a vibration transmission level at a predetermined frequency band. Since claim 10 contains features that are similar to the features argued above with respect to claim 8, those arguments are respectfully submitted to apply with equal force here.

Therefore, the novel combination of claim 10 including *means of calculating a vibration transmission level at a predetermined frequency band between said at least two vibration detection points* is not suggested or taught by Hodges, which lacks calculating vertical displacement between at least two measuring wheels, calculating a vibration transmission level and calculating a vibration transmission level at a predetermined frequency band. For at least these reasons, Applicant respectfully submits that independent

claim 10 is patentably distinguishable from Hodges. Therefore, Applicant respectfully requests the Examiner to reconsider and to withdraw this rejection of independent claim 10. In addition, claim 11 is patentable at least by virtue of its dependency on claim 10.

Claims 27 and 28

Claims 27 and 28 are patentable at least by virtue of their dependency on claim 6. Therefore, Applicant respectfully requests the Examiner to withdraw this rejection.

IV. Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 6, 7, 16-18, 25-26 and 34-39 are allowable if amended to overcome the rejection under 35 U.S.C. § 112, second paragraph. Applicant respectfully submits that the rejection under 35 U.S.C. § 112 is overcome, therefore, Applicant respectfully requests the Examiner to allow these claims.

In addition, Applicant thanks the Examiner for indicating that claims 2, 12-15 and 29-33 contain allowable subject matter and would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Applicant holds the rewriting of claims 2, 12-15 in abeyance until the arguments presented with respect to independent claims 1 and 8 have been reconsidered. Claims 29-33 are allowable by virtue of their dependency on the independent claim 6, which contains allowable subject matter.

V. Conclusion.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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